

WHAT IS CLAIMED IS:

1. A heat storage tank for storing a coolant of a liquid-cooled engine, the heat storage tank comprising:

a tank body in which the coolant is stored while being substantially thermal-insulated, the tank body having an inner wall surface for defining a cylindrical opening portion at one end side;

a coolant passage portion having an insertion portion to be inserted into the cylindrical opening portion in an axial direction of the cylindrical opening portion, the coolant passage portion defining therein a flow passage communicating with the tank body, through which the coolant flows into and flows out of the tank body; and

at least two O-rings for sealing a clearance between the insertion portion and the inner wall surface defining the cylindrical opening portion, the two O-rings being disposed between an outer wall surface of the insertion portion and the inner wall surface defining the cylindrical opening portion of the tank body to be lined in the axial direction of the cylindrical opening portion.

2. The heat storage tank according to claim 1, wherein:

one of the insertion portion and the inner wall surface defining the cylindrical opening portion has two groove portions separated from each other in the axial direction; and

the two O-rings are disposed in the two groove portions in parallel with each other to be separated from each other in the axial direction by a predetermined distance.

3. The heat storage tank according to claim 1, wherein:  
the coolant passage portion is made of a resin material;  
the coolant passage portion is constructed of a first portion  
at a predetermined position of the flow passage, and a second portion  
that is a residual part of the coolant passage portion except for  
the first portion; and

the first portion is attached to the second portion after  
the first portion is formed separately from the second portion.

4. The heat storage tank according to claim 1, further  
comprising at least any one of a temperature sensor for detecting  
a temperature of the coolant flowing out of the tank body, and  
a drain portion for draining the coolant stored in the tank body,  
wherein at least one of the temperature sensor and the drain portion  
is provided in the coolant passage portion.

5. The heat storage tank according to claim 1, wherein:  
the two O-rings are first and second O-rings provided to be  
separately from each other in the axial direction;

the first O-ring is disposed to directly seal a clearance  
communicating with an inner space of the tank body; and

the second O-ring is disposed to prevent air from being supplied  
to the first O-ring.

6. The heat storage tank according to claim 5, wherein:  
the first O-ring is made of a first material having a high

resistance to the coolant; and

the second O-ring is made of a second material having a high resistance to air, the second material being different from the first material.

7. The heat storage tank according to claim 1, wherein the two O-rings contact the outer wall surface of the insertion portion and the inner wall surface of the tank body defining the cylindrical opening portion, to automatically adjust an axis of the insertion portion and an axis of the cylindrical opening portion in parallel with each other.

8. The heat storage tank according to claim 7, wherein:

the tank body includes an inner tank portion for storing the coolant therein and an outer tank portion covering the inner tank portion through a vacuum layer that is used as a heat insulation layer;

the inner tank portion has the inner wall surface defining the cylindrical opening portion; and

the two O-rings have outer peripheral surfaces tightly contacting the inner wall surface of the inner tank portion defining the cylindrical opening portion.

9. The heat storage tank according to claim 8, further comprising:

a first bracket to which the outer tank portion is attached;  
and

a second bracket to which the insertion portion is attached,  
wherein:

the outer tank portion and the insertion portion are attached  
to a vehicle body through the first and second brackets,  
respectively; and

the inner tank portion is fixed to the vehicle body through  
the two O-rings and the insertion portion.